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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/538,167	06/08/2005	Anne-Mette Hilmen	021645-000400US	2248

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EXAMINER

ENIN-OKUT, EDU E

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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10/15/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/538,167	Applicant(s) HILMEN ET AL.	
	Examiner Edu E. Enin-Okut	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) 5-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 6-8-2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/8/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election, with traverse, of Group I and Species A (claims 1-4) in the reply filed on July 25, 2008 is acknowledged.

Claims 5-13 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on July 25, 2008.

2. Applicant's election with traverse of Group I and Species A in the reply filed on July 25, 2008 is acknowledged. The traversal is on the ground(s) that "... the application restriction requirements are controlled by the MPEP, and by PCT rules". This is not found persuasive because, as discussed in the MPEP 1893.03(d), unity of invention (not restriction practice pursuant to 37 CFR 1.141 -1.146) is applicable in national stage applications submitted under 35 U.S.C. 371. See also 37 CFR 1.475.

The requirement is still deemed proper and is therefore made FINAL.

Priority

3. Acknowledgment is made of Applicant's claim for foreign priority to Norwegian Patent Application No. 20025925, filed on December 10, 2002, under 35 U.S.C. 119(a)-(d). A certified copy of that application has been received.

Specification

4. The disclosure is objected to because of the following informalities: Applicant states "... 6.7 bara ..." in Paragraph 49. It appears that this phrase should be -- 6.7 **bars** --.

Appropriate correction is required.

Claim Objections

5. Claim 3 is objected to because of the following informalities: The claim recites "... steam (361) is injected ...". It appears that this should be -- ... steam **(359)** is injected ... --. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "... the main part of the H₂ and CO in the anode exhaust...". It is unclear what amount Applicant is referring to by the use of the term "main part". (It should be noted that claims 2-4 are dependent upon claim 1.)

Claim 4 recites "... that most of the CO₂ is not emitted ...". It is unclear how much of the CO₂ is not emitted by the use of the term "most".

Applicant is asked to clarify.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schramm, US 5,079,103 (cited in IDS) in view of Edlund et al., US 5,997,594 and Hamada, JP 11-116202 A.

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Regarding claim 1, Schramm teaches a method for treatment of gas exiting the anode side of a solid oxide fuel cell stack fuelled with a carbon containing fuel in a power producing process (Abstract), characterized in that the anode gas and cathode gas are kept separated by a seal system in the SOFC stack (Figure; claim 1), that the main part of the H₂ and CO in the anode exhaust is separated from the CO₂ in said exhaust by a separation process (1:13-17, 1:32-35, 4:1-14).

Schramm teaches that the anode waste gas from high temperature fuel cells (i.e., a molten carbonate fuel cell or a solid oxide fuel cell) contains hydrogen, carbon dioxide, water and additional components such as those introduced in the hydrogen feed stream (Abstract; 4:1-4). (The hydrogen feed stream, a synthesis gas, contains both hydrogen and carbon monoxide (1:14-17, 3:45-50).) The anode waste stream is “scrubbed” to remove carbon dioxide using a pressure swing absorption system (4:11-18; claim 1).

Schramm does not expressly teach that the separation process is based on H₂ selective membranes.

Edlund teaches that a steam reformer with an internal hydrogen purification using a hydrogen-permeable and hydrogen-selective membrane to remove trace levels of CO and CO₂. The process for producing purified hydrogen begins upstream of this process by reacting an alcohol or a hydrocarbon and steam to produce product hydrogen, carbon monoxide, and carbon dioxide (2:18-40), similar to the exhaust gases produced by fuel cell reactions (see Schramm, 4:1-4).

Schramm and Edlund are analogous art because they are both concerned with the processing of gases used as fuel sources for fuel cells (see Edlund, 1:15-22).

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the reformer of Edlund, with its hydrogen selective membrane, in the place of the pressure swing absorption system of Schramm, to produce hydrogen sufficiently purified for fuel cell applications in a more compact device operating at lower temperatures not limited by the normal equilibrium limitations (1:15-22, 2:1-14).

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Regarding claim 3, Schramm, as modified by Edlund, does not expressly teach that steam is injected on the permeate side of the hydrogen selective membranes.

Hamada teaches that the use of a sweep gas to discharge the permeate side of a hydrogen separation membrane (Abstract). The use of the sweep gas increases the partial pressure of hydrogen on pre-separation side of the membrane is greater than that of the post-separation side (Abstract).

One of ordinary skill would appreciate that the creation of the partial pressure differential, as taught by Hamada, will drive the separation process towards the formation of purified H₂ gas.

Schramm, Edlund and Hamada are analogous art because they are concerned the separation of gas streams to produce hydrogen.

Therefore, that artisan would have found it obvious at the time of the invention to include the use of a sweep gas, as taught by Hamada, in the hydrogen separation process of Schramm, as modified by Edlund, in order to drive the process toward the production of purified hydrogen.

Regarding claim 4, Schramm teaches the recovered H₂ is fed back to the main SOFC stack and used as fuel (4:18-23; Figure).

11. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schramm and Edlund as applied to claim 1, further in view of Hsu, US 2003/0008183.

Schramm and Edlund are applied and incorporated herein for the reasons above.

Regarding claim 2, Schramm and Edlund does not expressly teach that teaches that the anode exhaust is treated such that most of the CO₂ is not emitted to the atmosphere.

Hsu teaches the use of a fuel cell in a power generating station capable of low to zero greenhouse gas emissions (Abstract; para. 5). When a solid oxide fuel cell is used, the fuel stream output medium includes carbon dioxide and steam without being diluted by nitrogen (para. 49). The carbon dioxide can be collected, sequestered or stored in a carbon dioxide collection unit (para. 40, 49). This forms a zero/low emission station since the CO₂ is not vented or exhausted into the environment (para. 58).

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It would have been obvious to one of ordinary skill in the art at the time of the invention to collect, sequester or store the carbon dioxide produced by Schramm, as modified by Edlund, in a collection unit, as taught by Hsu, in order to reduce or eliminate potentially harmful greenhouse gas emissions from the cell.

Correspondence / Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Edu E. Enin-Okut** whose telephone number is **571-270-3075**. The examiner can normally be reached on Monday-Thursday, 8 a.m. - 4 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edu E Enin-Okut/
Examiner, Art Unit 1795

/SUSY N TSANG-FOSTER/
Supervisory Patent Examiner, Art Unit 1795